Contents

1. Options

1.1 Optional control cards

The following control cards built in inverter (for FRENIC5000G11S Series) are provided as options.

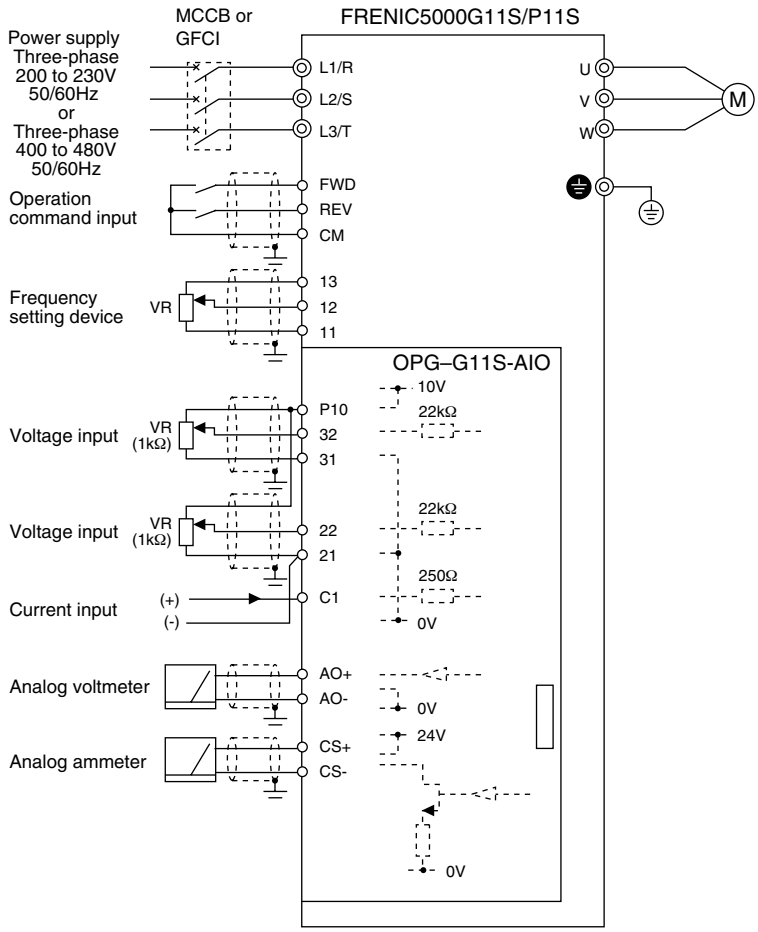
■ List of option cards

Name	Type	Function
Analog I/O interface card	OPC-G11S-AIO	• Auxiliary input for analog frequency setting (0 to ± 10V, 4 to 20mA) • Analog monitoring of inverter output frequency, output current, and torque.
Digital I/O interface card	OPC-G11S-DIO	• For setting frequency using a binary code • For monitoring frequency, output voltage, output current using a binary code (8 bit)
PG feedback card	OPC-G11S-PG	• For performing quick response torque-vector control using feedback signals from a pulse generator. • For 12V or 15V dc.
	OPC-G11S-PG2	• For performing quick response torque-vector control using feedback signals from a pulse generator. • For 5V dc.
	OPC-G11S-PGA	• For performing quick response torque-vector control using feedback signals from a pulse generator. • The frequency dividing output can be made.
Synchronized operation card	OPC-G11S-SY	• For synchronized operation of two motors
Relay output card	OPC-G11S-RY	• Includes four relay output circuits. • Converts transistor output signals from inverter control output terminals Y1 to Y4 to relay (1SPDT) output signals.

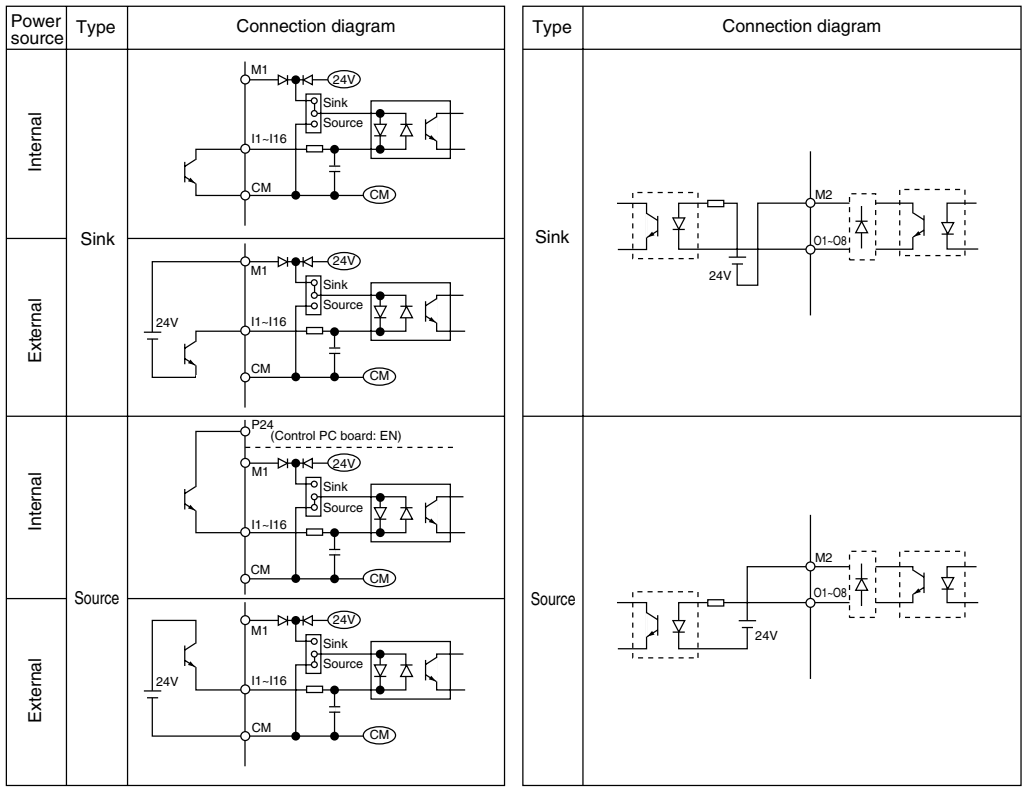
1.2 Other exclusive options

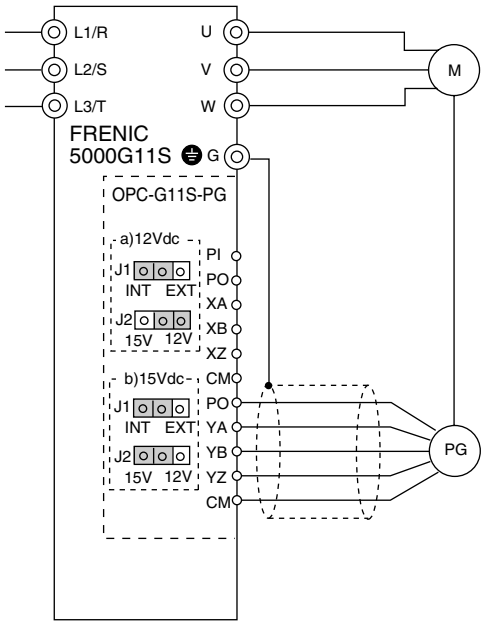
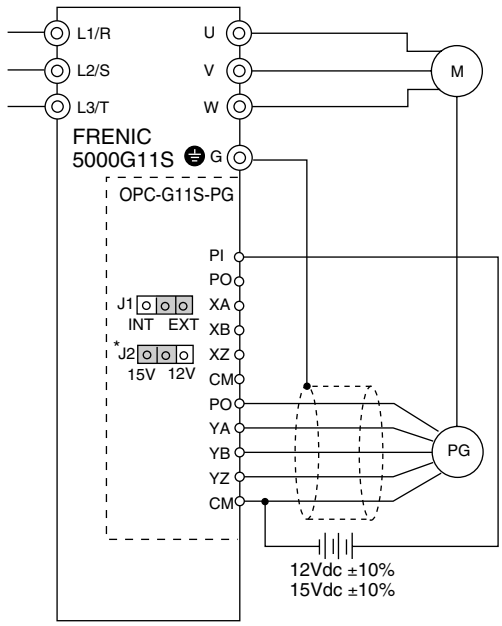
Name	Type	Function
Extension cable for keypad panel	CBIII-10R-☐☐	Connects the keypad panel to an inverter unit. Three cable types are available: straight 6.6ft (2m), curled 3.3ft (1m), and curled 6.6ft (2m). The curled 3.3ft (1m) cable can be externded up to 16ft (5m), and the curled 6.6ft (2m) cable up to 33ft (10m). Note: Cables once extended to the maximum length do not return to their original length.
IP20 enclosure adapter	P20G11-☐☐	• Used to put 40HP or larger model to change its enclosure of IP00 into that of IP20.
Mounting adapter for external cooling	PBG11-☐☐	• Used to put the cooling fan section of the inverter outside the panel. • Only applicable to 30HP and below inverters. (40HP and above inverters can be modified to external cooling type by replacing the mounting bracket, as standard.)
Panel-mount adapter	MAG9-☐☐	Used to put an FRN-G11S inverter to be mounted in panel holes that were used to mount an FVR-G7S inverter.

1.3 Detailed specifications

Name		Analog I/O interface card
Type	**Card-type**	OPC-G11S-AIO
	Unit-type	–
Function		3 analog inputs (2 voltage inputs and 1 current input): Torque limiting value (Driving, braking), frequency setting, ratio setting can be input respectively. 2 analog outputs (1 voltage output and 1 current output): 11 types of data can be output.
Specifications	**Input**	Analog signal input (3 points) by short-circuiting terminals between 32, 22, C2-21, and 31. Terminal 32: Voltage input (both side) : 0 to ±10Vdc / 0 to ±100%, input impedance: 22kΩ Terminal 22: Voltage input (single side) : 0 to +10Vdc / 0 to +100%, input impedance: 22kΩ Terminal C2: Current input : 4 to 20mAdc / 0 to +100%, input impedance: 250Ω For voltage input, power supply terminal for variable resistor (P10) should be connected. Related function code: o22
	Output	Analog signal output (2 points) by short-circuiting terminals between AO+, AO-, CS+, and CS-. Terminal AO+ : Voltage output : 0 to ±10Vdc, for max. 2 voltmerters, input impedance: 10kΩ Terminal AO- : Voltage output common Terminal CS+ : Current output : 4 to 20mAdc, max. 500Ω Terminal CS- : Current output common (Terminal CS- is isolated from terminal 21, 31, and AO-.) Related function code: o23
	Power source	Power supply terminal for variable resistor: P10 +10Vdc (10mA)
Connection diagram		
Remarks		

Name		Digital I/O interface card
Type	**Card-type**	OPC-G11S-DIO
	Unit-type	–
Function		4 digital inputs : Binary code input of max. 16 bits or four-digit BCD input (Sink/Source changeable) 3 digital outputs : Binary code output of max. 8 bits.
Specifications	**Input**	Digital signal input (4 points) by short-circuiting terminals between I1, I16, and M1 <Sink> ON operation current : 4.5mA max. OFF operation voltage : 27V max. <Source> ON operation current : 4.5mA max. OFF operation voltage : 27V max. Related function code : o19, o22
	Output	Digital signal output (3 points) by short-circuiting terminals between O1 to O6, and M2. <Sink> ON operation current : 50mA max. OFF operation voltage : 27V max. <Source> ON operation current : -50mA max. OFF operation voltage : 27V max. Related function code : o21
	Power source	+24Vdc (3.2mA x 8 = 25.6mA)
Connection diagram		<Input interface> <Output interface>
Remarks		



Name		PG feedback card	
Type	**Card-type**	OPC-G11S-PG	
	Unit-type	–	
Function		To perform speed control by detecting motor rotating speed using a pulse generator.	
Specifications	**Control**	**Speed control range**	1:1200 (3 to 3600r/min)
		Maximum speed	3600r/min (120Hz)
		Speed control accuracy	± 0.02%
		Speed control response	40Hz
	Applicable encoder (generator)	• No. of output pulse: 100 to 3000P/R A/B phase (incremental) • Maximum response frequency: 100kHz • Pulse output method: Totem pole / open collector, Output current: 7mA or more	
	Input terminal	**YA, YB, CM**	Connect A- and B-phase output signal from pulse generator on feedback side
		YZ, CM	Connect Z-phase output signal from pulse generator on feedback side. When the pulse generator does not have Z-phase, these terminals need not be connected.
	Output	None	
	Power source	• Internal power source: +15Vdc ±10%/120mA, +12Vdc ±10%/120mA (Changeable on PC board) *1) (Terminal: PO, CM) • External power source: +12Vdc (-10%) to +15Vdc (+10%)/300mA or less *2) (Terminal: PI, CM) *1) Use external power source when more than one PG feedback cards are used and the total input current exceeds 120mA. *2) Take note of the power source matches the specifications of the applied pulse generator.	
Connection diagram		1. When using inverter internal power source 	2. When using external power supply  * Pin J2 can be connected to both 12V side and 15V side.
Remarks		Terminals XA, XB, and XZ are not in use.	

*) OPC-G11S-PG2 for 5Vdc power source is available.

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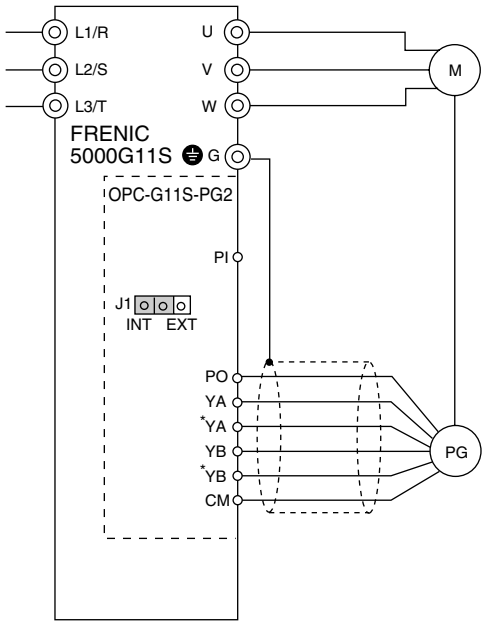
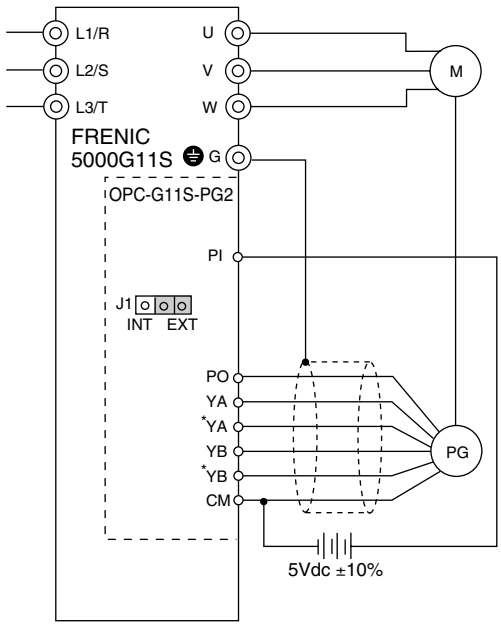
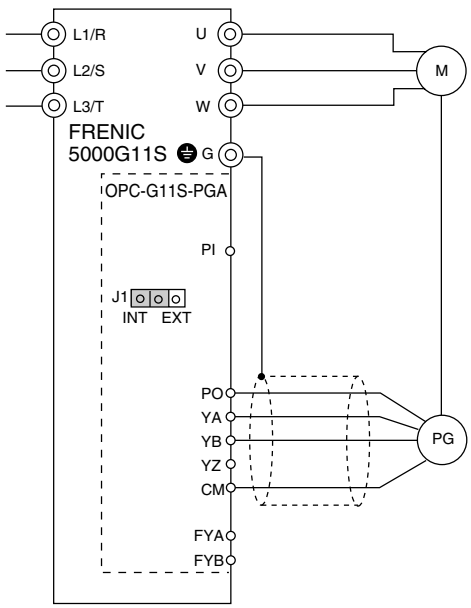
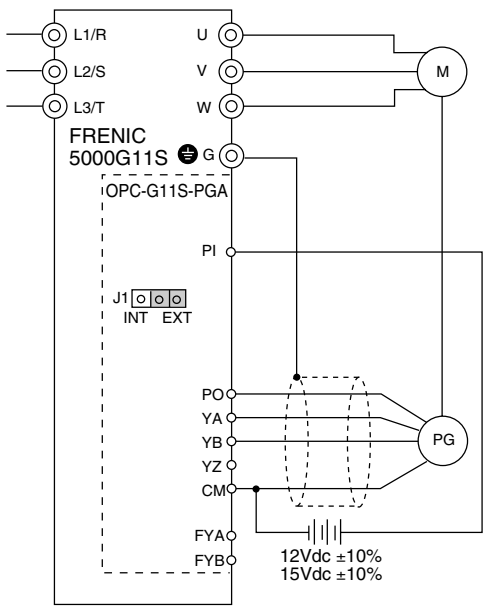
<table>
<tr><th colspan="2">Name</th><th colspan="3">PG feedback card (PG power input : +5V)</th></tr>
<tr><td rowspan="2">Type</td><td>Card-type</td><td colspan="3">OPC-G11S-PG2</td></tr>
<tr><td>Unit-type</td><td colspan="3">–</td></tr>
<tr><td colspan="2">Function</td><td colspan="3">To perform speed control by detecting motor rotating speed using a pulse generator.</td></tr>
<tr><td rowspan="5">Specifications</td><td rowspan="4">Control</td><td>Speed control range</td><td>1:1200 (3 to 3600r/min)</td><td rowspan="4">For the applicable motor,
see the combination list of inverter and dedicated motor with PG.</td></tr>
<tr><td>Maximum speed</td><td>3600r/min (120Hz)</td></tr>
<tr><td>Speed control accuracy</td><td>± 0.02%</td></tr>
<tr><td>Speed control response</td><td>40Hz</td></tr>
<tr><td>Applicable pulse generator</td><td colspan="3">• No. of output pulse: 20 to 3000P/R A/B phase (incremental)
• Maximum response frequency: 100kHz
• Pulse output method: Line driver</td></tr>
<tr><td rowspan="2">Input terminal</td><td>YA, YB, CM</td><td colspan="2">Connect A- and B-phase output signal from pulse generator on feedback side</td></tr>
<tr><td>YZ, CM</td><td colspan="2">Connect Z-phase output signal from pulse generator on feedback side. When the pulse generator does not have Z-phase, these terminals need not be connected.</td></tr>
<tr><td>Output</td><td colspan="3">None</td></tr>
<tr><td>Power source</td><td colspan="3">• Internal power source: +15Vdc ±10%/200mA, (Terminal: PO, CM)*1)
• External power source: +5Vdc (±10%) to +15Vdc (+10%)/300mA or less *2) (Terminal: PI, CM)
*1) Use external power source when more than one PG feedback cards are used and the total input current exceeds 200mA.
*2) Take note of the power source matches the specifications of the applied pulse generator.</td></tr>
<tr><td colspan="2">Connection diagram</td><td colspan="3">1. When using inverter internal power source
 

2. When using external power supply
 

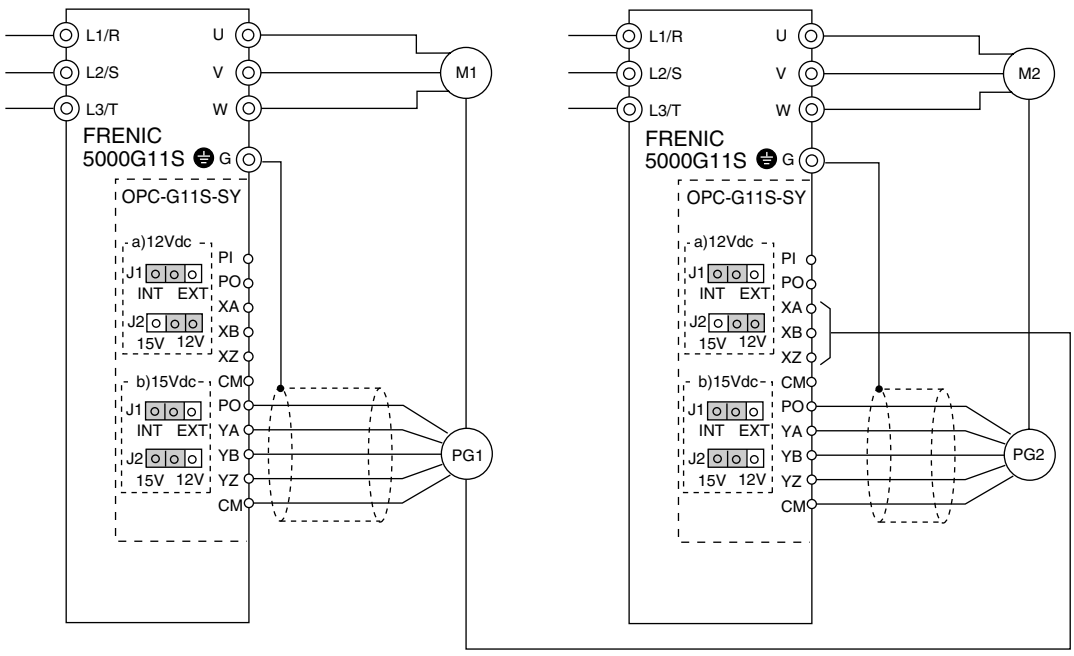
* Pin J2 can be connected to both 12V side and 15V side.</td></tr>
<tr><td colspan="2">Remarks</td><td colspan="3">Terminals XA, XB, and XZ are not in use.</td></tr>
</table>

Name		PG feedback card (Frequency dividing output)		
Type	**Card-type**	OPC-G11S-PGA		
	Unit-type	–		
Function		To perform speed control by detecting motor rotating speed using a pulse generator. To perform the specified frequency dividing output of input pulses from the pulse generator.		
Specifications	**Control**	**Speed control range**	1:1200 (3 to 3600r/min)	For the applicable motor, see the combination list of inverter and dedicated motor with PG.
		Maximum speed	3600r/min	
		Speed control accuracy	± 0.02%	
		Speed control response	40Hz	
	Applicable pulse generator	• No. of output pulse: 20 to 3000P/R A/B phase (incremental) • Maximum response frequency: 100kHz (Totem pole) / 25kHz (Open collector) • Total wiring length : 100m (Totem pole) / 20m (Open collector) • Pulse output method: Line driver		
	Input terminal	**YA, YB, CM**	Connect A- and B-phase output signal from pulse generator on feedback side	
		YZ, CM	Connect Z-phase output signal from pulse generator on feedback side. When the pulse generator does not have Z-phase, these terminals need not be connected.	
	Output	FYA, FYB : A-phase, B-phase frequency dividing output terminal Frequency dividing ratio: 1/1 to 1/64 Rating: 27Vdc max., 50mA max.		
	Power source	• Internal power source: +15Vdc ±5%/120mA *1), +12Vdc ±5%/120%mA *1) (Terminal: PO, CM) • External power source: +5Vdc (±10%) to +15Vdc (+10%)/300mA or less *2) (Terminal: PI, CM) *1) Use external power source when more than one PG feedback cards are used and the total input current exceeds 200mA. *2) Take note of the power source matches the specifications of the applied pulse generator.		
Connection diagram		1. When using inverter internal power source  2. When using external power supply  * Pin J2 can be connected to both 12V side and 15V side.		
Remarks		Terminals XA, XB, and XZ are not in use.		

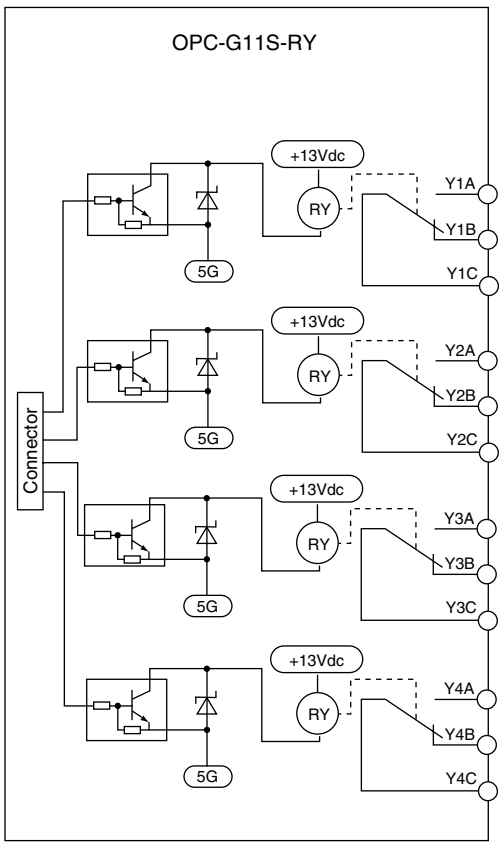
Combination list of inverter and dedicated motor with PG

Power supply voltage	Inverter		Dedicated motor with PG			Remarks
	Type	Rated output current [A]	Type	Rated output current [A]	Maximum speed [r/min]	
Three-phase 230V	FRNF25G11S-2UX	1.5	–	–	–	*3)
	FRNF50G11S-2UX	3				
	FRN001G11S-2UX	5	MVK6096A–C	4.8	3600	
	FRN002G11S-2UX	8	MVK6097A–C	7		
	FRN003G11S-2UX	11	MVK6107A–C	11		
	FRN005G11S-2UX	17	MVK6115A–C	18		*1)
	FRN007G11S-2UX	25	MVK6133A–C	27		*2)
	FRN010G11S-2UX	33	MVK6135A–C	37		
	FRN015G11S-2UX	46	MVK6165A–C	49		
	FRN020G11S-2UX	59	MVK6167A–C	63		
	FRN025G11S-2UX	74	MVK6184A–C	74		
	FRN030G11S-2UX	87	MVK6185A–C	90		*1)
	FRN040G11S-2UX	115	MVK6206A–C	116	3000	*2)
	FRN050G11S-2UX	145	MVK6207A–C	143		
	FRN060G11S-2UX	180	MVK6208A–C	170		*4)
			MVK9221A–C	180	2400	
	FRN075G11S-2UX	215	MVK9250A–C	211		
	FRN100G11S-2UX	283	MVK9252A–C	280		
	FRN125G11S-2UX	346	MVK9280A–C	328	2000	
Three-phase 460V	FRNF50G11S-4UX	1.5	–	–	–	*3)
	FRN001G11S-4UX	2.5				
	FRN002G11S-4UX	3.7				
	FRN003G11S-4UX	5.5				
	FRN005G11S-4UX	9	MVK6115A–C	9	3600	
	FRN007G11S-4UX	13	MVK6133A–C	13.5		*2)
	FRN010G11S-4UX	18	MVK6135A–C	18.5		
	FRN015G11S-4UX	24	MVK6165A–C	24.5		
	FRN020G11S-4UX	30	MVK6167A–C	32		
	FRN025G11S-4UX	39	MVK6184A–C	37		
	FRN030G11S-4UX	45	MVK6185A–C	45		
	FRN040G11S-4UX	60	MVK6206A–C	58	3000	
	FRN050G11S-4UX	75	MVK6207A–C	71		
	FRN060G11S-4UX	91	MVK6208A–C	85		*4)
			MVK9221A–C	87	2400	
	FRN075G11S-4UX	112	MVK9250A–C	103		
	FRN100G11S-4UX	150	MVK9252A–C	140		
	FRN125G11S-4UX	176	MVK9280A–C	164	2000	
	FRN150G11S-4UX	210	MVK9282A–C	196		
	FRN200G11S-4UX	253	MVK9310A–C	236		
	FRN250G11S-4UX	304	MVK9312A–C	283		
	FRN300G11S-4UX	377	MVK9316A–C	351		
	FRN350G11S-4UX	415	MVK9318A–C	389		
	FRN400G11S-4UX	520	Contact Fuji			
	FRN450G11S-4UX	585				
	FRN500G11S-4UX	650				
	FRN600G11S-4UX	740				

*1) The inverter rated output current is larger than the motor rated current and the motor thermal characteristics has limitation. Use the equipment at ambient temperature 40℃ (104℉) or below.
*2) Though the inverter rated output current is larger than the motor rated current. There is no problem in use.
*3) The combination should be studied for each product. Contact Fuji.
*4) You can select an appropriate motor out of two types motors.

Name		Synchronized operation card	
Type	**Card-type**	OPC-G11S-SY	
	Unit-type	–	
Function		To perform position control by pulse train input, synchronized operation of 2 motors (simultaneous-start-and-synchronize operation and proportional speed ratio operation)	
Specifications	**Control**	**Speed control range**	1:1200 (3 to 3600r/min)
		Maximum speed	3600r/min (120Hz)
		Speed control accuracy	± 0.02%
		Speed control response	40Hz
	Applicable encoder (generator)	• No. of output pulse: 20 to 3000P/R A/B phase (incremental) • Maximum response frequency: 100kHz (Totem pole) / 25kHz (Open collector) • Wiring length: 328ft (100m) (Totem pole) / 66ft (20m) (Open collector) • Pulse output method: Totem pole / Open collector, Output current: 7mA or more	
	Input	**Terminal**	**Function**
		XA, XB, CM	Connect A- and B-phase output signal of master rotary encoder.
		XZ, CM	Connect Z-phase output signal of master rotary encoder.
		YA, YB, CM	Connect A- and B-phase output signal of feedback or master rotary encoder.
		YZ, CM	Connect Z-phase output signal of feedback or master rotary encoder.
	Output	None	
	Power source	• Internal power source: +15Vdc ±10% / 120mA, +12Vdc ±10% / 120mA (Changeable on PC board)*1) (Terminal: PO, CM) • External power source: +12Vdc (-12%) to +15Vdc (+10%) / 300mA or less *2) (Terminal: PI, CM) *1) Use external power source when more than one synchronized operation cards are used and the total input current exceeds 120mA. *2) Take note of the power source matches the specifications of the applied rotary encoder.	
Connection diagram		1. <Master side> <Slave side>  The above diagrams are used for when inverter internal power source is used. When using external power source, perform connection similar to the above connection, by referring to “2. When using external power supply" of PG feedback card (page 5-5)	
Remarks			

5

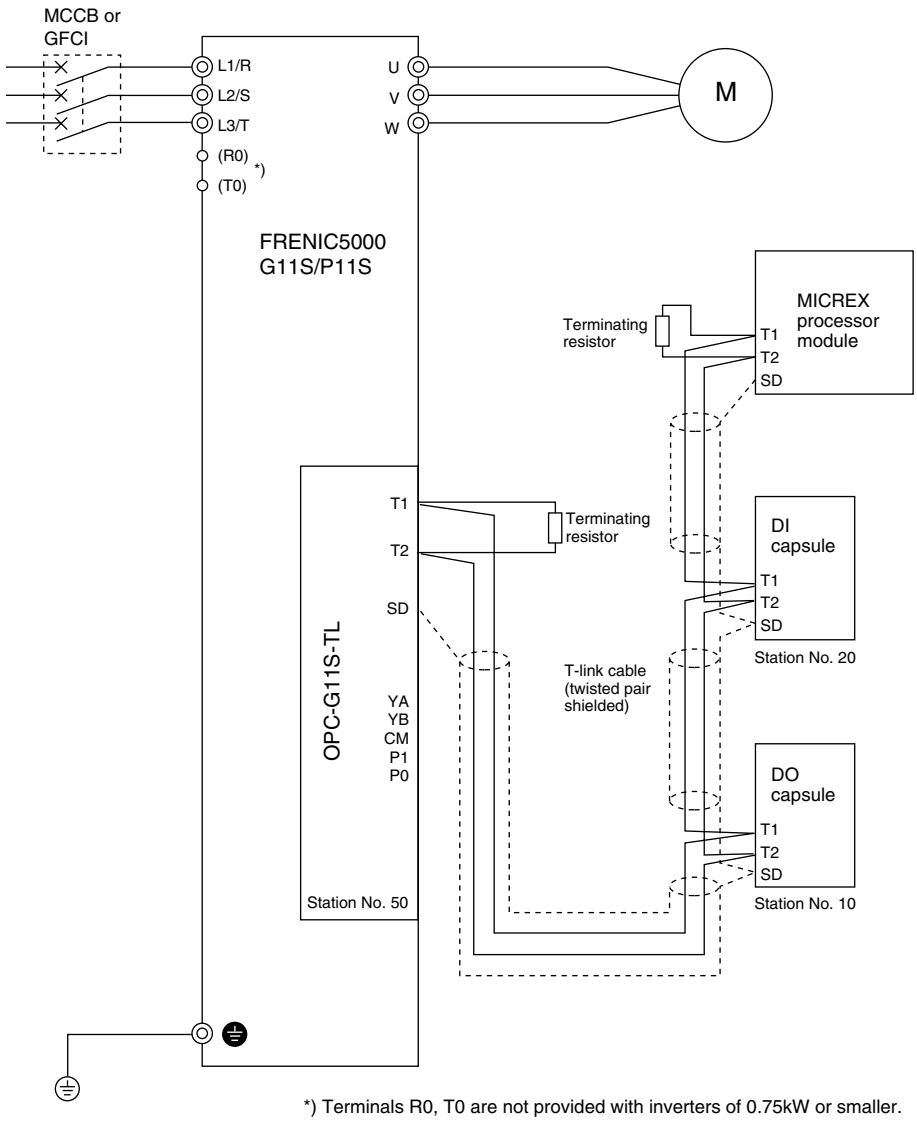
Name		Relay output card	
Type	**Card-type**	OPC-G11S-RY	*)
	Unit-type	–	–
Function		• Includes four relay output circuits. • Converts transistor output signals from inverter control output terminals Y1 to Y4 to relay (1SPDT) output signals.	In addition to the relay output function, PG vector control can be performed with the feedback signal from pulse generator.
Specifications	**Input**	None	Connect the pulse generator A-phase, B-phase output signal.
	Output	Four-channel contact (12 terminals from Y1A to Y4C) 250Vac, 0.3A, cos ø = 0.3	None
	Power source	The power source to drive the relay card is supplied from inverter.	• Internal power source: +15Vdc ±10%/120mA, +12Vdc ±10%/120mA (Changeable on PC board) *1) • External power source: +12Vdc (-10%) to +15Vdc (+10%)/300mA or less *2) *1) Use external power source when more than one relay output cards are used and the total input current exceeds 120mA. *2) Take note of the power source matches the specifications of the applied pulse generator.
Connection diagram			Refer to the connection diagram of PG feedback card.
Remarks			*) When the relay output card has to be used together with the PG feedback card, the card will be made-to-order. Contact Fuji.

Optional communication card

The following optional communication card are available for FRENIC5000G11S series inverter.

Name	Type	Function
T-link card	OPC-G11S-TL	• Setting of operation frequency • Setting of operation command (FWD, REV, RST, etc.) • Setting and reading out of function code and data code • Monitoring of operating status • Reading out of inverter trip data
Open-bus card	OPC-G11S-PDP	• Conforming to Profibus
	OPC-G11S-DEV	• Conforming to DeviceNet
	OPC-G11S-MBP	• Conforming to Modbus Plus
	OPC-G11S-IBS	• Conforming to Interbus-S
	OPC-G11S-COP	• Conforming to CAN-open

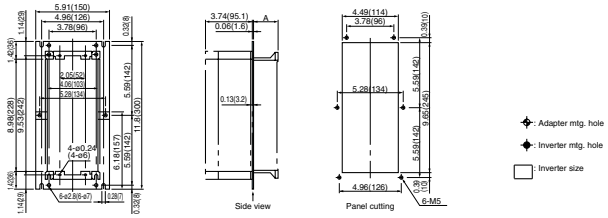
For details of open-bus cards, see individual instruction manual.

Name		T-link interface card
Type	**Card-type**	OPC-G11S-TL
	Unit-type	–
Function		To connect inverter to FUJI MICREX series PLC to control inverter from PLC. Setting and monitoring function data for function codes can be made.
Specifications	**Transmission specification**	T-link slave I/O transmission
	No. of words used	8 words: MICREX → Inverter: 4 words Inverter → MICREX: 4 words
	Terminal	Terminal T1, T2, SD: T-link cable connection terminal (Use general-purpose cable described in instruction manual.)
	Relative function code	o27, o28, o29
	Power source	None
Connection diagram		 *) Terminals R0, T0 are not provided with inverters of 0.75kW or smaller.
Remarks		

■ Exclusive option specifications

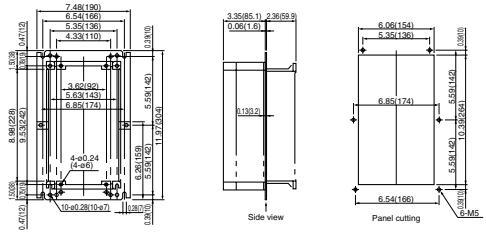
• Mounting adapter for external cooling (PGB11-□□)

Used to put the cooling fan section of the inverter outside the panel.
Only applicable to 30HP or smaller inverter. (40HP or larger inverter can be modified to external cooling type by replacing the mounting bracket, as standard.)

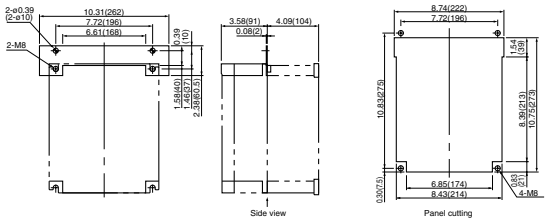


unit: inch (mm)

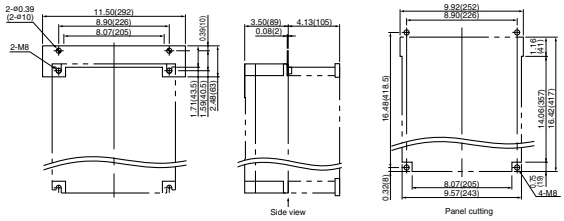
Option type	Applicable inverter	A
PBG11-0.75	FRNF25G11S-2UX to FRN001G11S-2UX FRNF50G11S-4UX	1.37 (34.9)
	FRN001G11S-4UX	1.97(49.9)



Option type	Applicable inverter
PBG11-3.7	FRN002G11S-2UX to FRN005G11S-2UX FRN002G11S-4UX to FRN005G11S-4UX



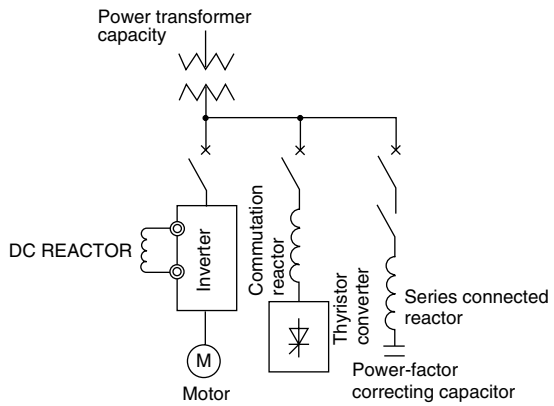
Option type	Applicable inverter
PBG11-7.5	FRN007G11S-2UX to FRN010G11S-2UX FRN007G11S-4UX to FRN010G11S-4UX FRN007P11S-2UX to FRN015P11S-2UX FRN007P11S-4UX to FRN015P11S-4UX



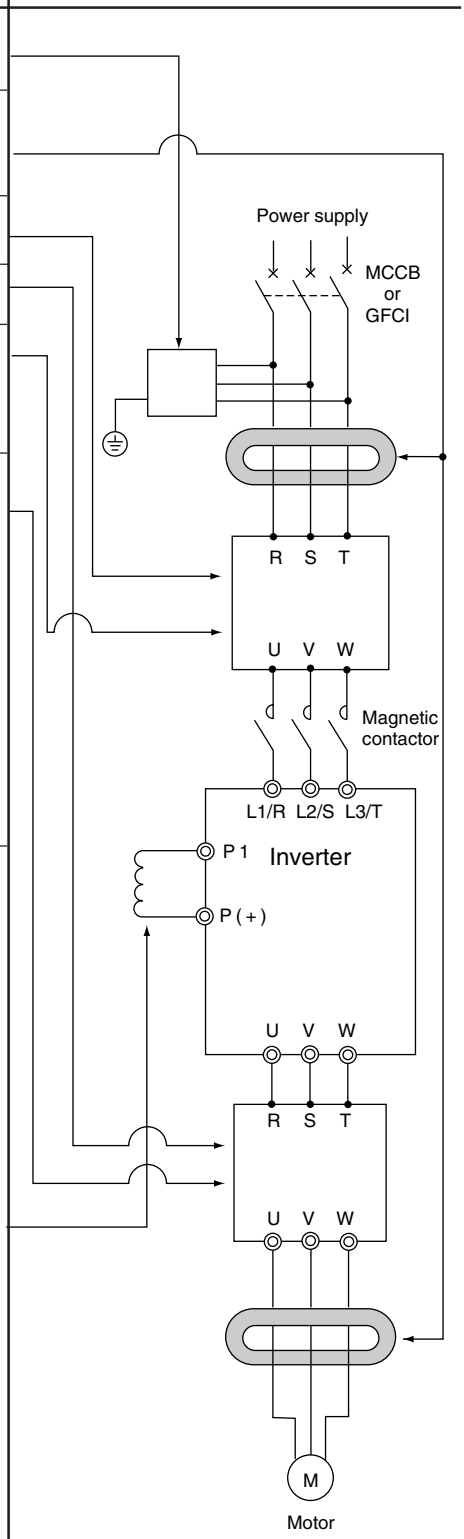
Option type	Applicable inverter
PBG11-22	FRN015G11S-2UX to FRN030G11S-2UX FRN015G11S-4UX to FRN030G11S-4UX FRN020P11S-2UX to FRN030P11S-2UX FRN020P11S-4UX to FRN030P11S-4UX

2. Optional Peripheral Equipment

2.1 Optional peripheral equipment

Name (Type)	Function
Arrester (CN23232) (CN2324E)	Suppresses induced lightning surges from power source, thus protecting all equipment connected from the power source.
Ferrite ring for reducing radio noise (ACL-40B) (ACL-74B)	Reduces radio frequency noise. If the wiring between motor and inverter is shorter than 66ft (20m), use the ferrite ring in the power supply side. If longer than 66ft (20m), use it in the output side.
Power filter (FHF-TA/□ □/250) (FHF-TA/□ □/500)	Prevents the noise generated from the inverter.
(FHF-TB/□ □/250) (FHF-TB/□ □/500)	Supresses radiation noise and induction noise generated from the output side wiring.
EMC compliance filter (EFL-□ □ □SP-2) (EFL-□ □ □G11-4) (RF3□ □ □-F11)	This is a special filter which complies with the European EMC (Emission) Directive. This filter should be used together with a ferrite core. Note: Other prerequisites must be fulfilled to ensure compliance with EMC Directives. Refer to this filters operation manual for details.
Output circuit filter (OFL-□ □ □-□) (OFL-□ □ □-4A)	Connected to the output circuit of inverters under low-noise operation with carrier frequency from 8 to 15kHz; 6kHz or higher for 40HP or larger inverters (OFL-□ □ □-□),0.75 to 15kHz; 0.75 to 10kHz for 100HP or larger inverters (OFL-□ □ □-4A). This filter has the following functions: ① Suppressing fluctuation of motor terminal voltage. Protects the motor insulation from being damaged by surge voltage. (460V) ② Suppressing leakage current from output side wiring. (OFL-□ □ □-□ only) Reduces the leakage current caused when several motors are operated in parallel or connected with long wiring. * Total wiring length should be less than 1300ft (400m). ③ Suppressing radial noise or inductive noise from output side wiring. Effective noise suppression device for long wiring applications such as plant. Note: When connecting OFL- □□□ -□,be sure to set the carrier frequency F26 at 8kHz or over.
DC REACTOR(DCR) (DCR4-□ □ □) (DCR2-□ □ □)	[Use the DCR to normalize the power supply in the following cases.] ① The power transformer capacity is 500kVA or over and exceeds the inverter rated capacity by 10 times. ② The inverter and a thyristor converter are connected with the same transformer. * Check if the thyristor converter uses a commutation reactor. If not, AC reactor must be connected to the power supply side. ③ Overvoltage trip occurs due to open/close of the phase-advancing capacitor for the power supply lines. ④ The voltage unbalance exceeds 2%. Voltage unbalance (%) = $\frac{\text{Max. voltage [V]} - \text{Min. Voltage [V]}}{\text{Three-phase average voltage [V]}} \times 67$ 
	[For improving input power-factor, reducing harmonics] • Used to reduce input harmonic current (correcting power-factor)
Surge absorber (Surge suppressor) (S2-A-O)(S1-B-O)	S2-A-O: for magnetic contactor S1-B-O: for mini control relay, or timer
Frequency meter (TRM-45) (FM-60)	Analog frequency meter TRM-45: 1.77inch (45mm) square FM-60: 2.36inch (60mm) square
Frequency setting device (RJ-13) (WAR3W-1kΩ)	Frequency setting potentiometer (mounted externally)

Mounting position

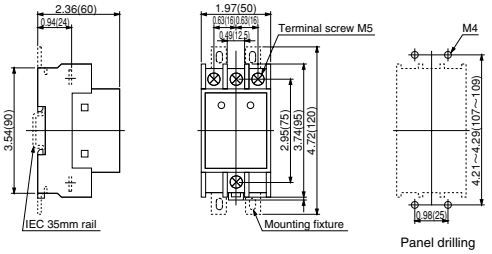


*) For the detailed selection, refer to Chapter 3, Peripheral Equipment.

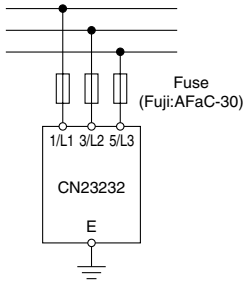
2.2 Specifications and dimensions

unit: inch (mm)

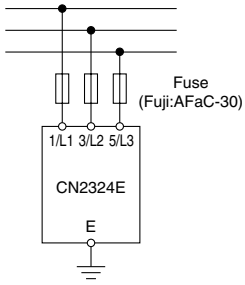
• Arrester (CN23232, CN2324E)



• Three-Phase 220V AC

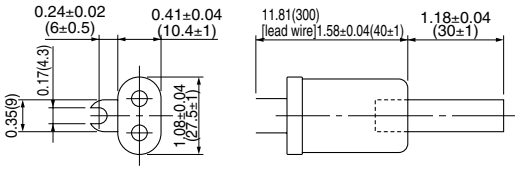


• Three-Phase 440V AC

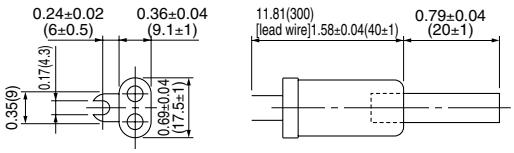


• Surge absorber (S2-A-O, S1-B-O)

S2-A-O (for magnetic contactor)

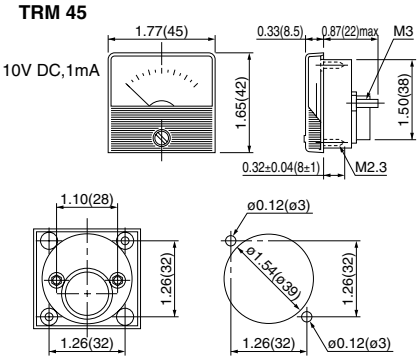


S1-B-O (for mini contorol relay or timer)

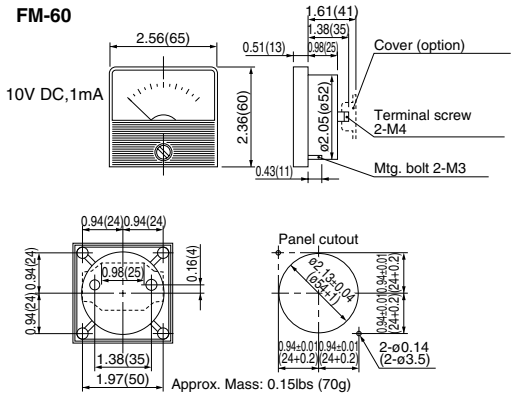


• Frequency meter (TRM-45, FM-60)

TRM 45

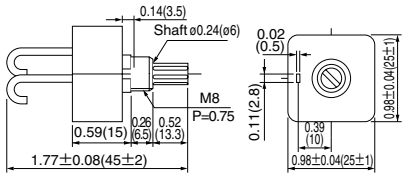


FM-60

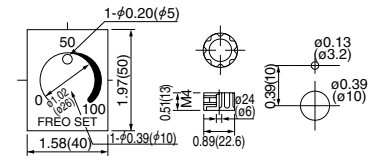


• Frequency setting device (RJ-13, WAR3W-1kΩ)

RJ-13 BA-2B Characteristic 1kΩ

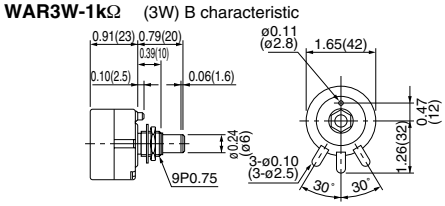


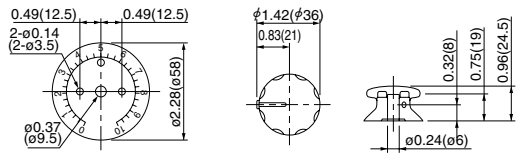
Legend plate(YS549810-0) Knob(MSS-2SB)



The legend plate and knob must be ordered as a separate item.

WAR3W-1kΩ (3W) B characteristic





The legend plate and knob are shipped together with the setting device.